ABSTRACT OF DISCLOSURE

Hand Controller and Wrist Devices

A compact four degrees of freedom parallel mechanism suitable for use as a hand control or wrist is provided that has backdrivability, is singularity free and has a large workspace and a large force reflecting capability. The structure is light but rigid, and the electric actuators are all placed on the ground or base and provide independent control of each degree of freedom. Each degree of freedom is connected to an actuator either directly or through a cable drive system. The first two degrees of freedom are created by two identical pantographs pivoted together on pivoted joints to define a hemispherical motion of an object (end point) about a center point (hemisphere center). The third and fourth degrees of freedom represent rotation and sliding motions of the object around and along the radius of the created hemisphere, respectively. The axes of these latter degrees of freedom are concentric, and these axes intersect with the axis of the pantographs pivoted joints at the hemispheric center.